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### Deposited in DRO:

11 April 2013

### Version of attached file:

Accepted Version

### Peer-review status of attached file:

Peer-reviewed

### Citation for published item:

Jones, Caroline H.D. and Ball, Helen L. (2013) 'Napping in English preschool children and the association with parents' attitudes.', *Sleep medicine*, 14 (4). pp. 352-358.

### Further information on publisher's website:

<http://dx.doi.org/10.1016/j.sleep.2012.12.010>

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**Napping in English preschool children, and the association with parents'  
attitudes**

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## Abstract

**Background:** Age-independent variability in children's napping duration may be influenced by parental preference and attitudes, and children's availability or lack of opportunity to nap. This study examined English preschool children's napping duration, frequency and location, and the association of daily nap duration with parents' attitudes towards napping.

**Methods:** Parents of 3-year-old children in deprived and non-deprived areas of a town in North-East England were interviewed about their attitudes towards child napping, and completed 4-day/5-night sleep diaries documenting their children's daytime and nighttime sleep.

**Results:** Of 84 children, half had at least one nap during the 4-day study period (median (interquartile range) daily nap duration across all children was 1 (21) minutes; for nappers only was 21 (34) minutes). Naps tended to be infrequent and short, and few (6%) occurred in a bedroom. Children whose parents allowed or encouraged napping had significantly longer daily nap duration (n=25, median (interquartile range) daily nap duration 21 (34) minutes) compared to those whose parents tried to prevent them from napping (n=29, 1 (21) minutes), and those whose parents reported that children did not want to nap (n=30, 0 (0) minutes) (U=23.21,  $p<.001$ ).

**Discussion:** Positive parental attitude towards napping was associated with longer child nap duration. Napping appeared to be mainly sporadic and opportunistic, and was negatively perceived and prevented by a third of parents. The consequences of premature nap cessation are not known; given the importance of sufficient sleep in childhood, perhaps we should consider enabling young children to nap more freely.

**Key words:** Napping; preschool children; parents; attitudes; England

## Introduction

Children's daytime napping duration is primarily explained by age [1] [2], with napping declining particularly rapidly around the age of 3-4 years in populations around the world [3] [4] [5]. Yet within populations substantial age-independent variability in napping behaviour remains. In a large cohort of English children, 23% of 9585 3-year-olds napped during the day, with a range in daily duration of over two hours (mean 63 minutes) [6].

The underlying explanations for age-independent variability in children's napping remain conjectural. It was hypothesised that cessation of napping is a marker for brain development, following observation of a negative correlation between daytime napping and neurocognitive function in preschool children [7]. Cross-cultural differences suggest biological determinants of napping [4]; however, the degree to which variability in napping behaviour is biologically-determined is difficult to elucidate. Prevalence and cessation of napping may be driven by cultural or parental preference and expectations as much as by child sleep need [4] [8].

Research indicates that parenting impacts on children's sleep [9], but parents' attitudes and expectations regarding napping, and their associations with children's napping duration, have been little explored. Both Ward et al. [10] and Weissbluth [5] concluded that the majority of young children nap when given the opportunity: perhaps the availability or lack of opportunity to nap explains some of the variability in napping between children. Issues related to the provision of napping opportunities are the locations where naps take place, and the frequency of napping within children. Addressing these little-examined issues could help to determine whether napping is routine, regular and regulated by parents, or is spontaneous and infrequent. This study aimed to examine preschool children's daytime napping (including duration,

frequency and location), parents' attitudes towards napping (including the provision of napping opportunities), and the association between parents' attitudes and children's daily nap duration.

Unlike nursery schools in countries such as the US [10] and Japan [11], most nursery schools in the UK do not provide children with the opportunity to nap. English children's opportunities to nap and napping patterns may therefore differ from those of children living elsewhere. Additionally, if napping is associated with parents' attitudes then it is important to examine the contribution of napping to children's overall daily sleep duration. Our secondary aims were to document the napping habits of English preschool children; and to examine the association of daily nap duration with other sleep-wake variables (sleep onset time, wake time, nighttime sleep duration and total 24-hour sleep duration).

## **Methods**

Participants were parents of 3-year-old children recruited at nursery schools in Stockton-on-Tees, a socio-economically diverse town in North-East England. Nursery schools in particularly deprived and non-deprived areas were purposively sampled (named the 'deprived' and 'non-deprived' socioeconomic groups respectively). Headteachers of nursery schools in selected areas were contacted in writing, and those who agreed to participate gave written informed consent.

At each participating nursery, all children attended for half a day, five days each week, and were not permitted to nap. Parents of all 3-year-old children, who could complete interviews and diaries in English, were eligible to participate. A small number were excluded on the basis of nursery staff discretion because of social services or police involvement, or mental illness.

Data were collected from May 2008-June 2009. Ethical approval was obtained from the Durham University Research Ethics Committee, and all participating parents provided written informed consent. No children had been diagnosed as suffering from sleep problems.

Parents participated in semi-structured interviews and then completed structured diaries for a consecutive period of 5 nights and 4 days (2 weekend days and 2 week days). Both methods covered children's daytime and nighttime sleep behaviours, as well as diet and activity. We report on napping and related outcomes here; other aspects of the sleep data are available elsewhere [12]. An anthropological interviewing style was adopted throughout; during interviews (all conducted by CJ) parents were prompted to talk about their children's napping habits, and how they felt about napping. Interviews were conversational and did not require answers to discrete questions, so that parents were able to frame responses in their own terms rather than in those imposed by researchers. CJ ensured that attitudes towards napping were discussed by all parents, either spontaneously, or as a result of prompting with open questions (e.g. 'Does s/he ever sleep during the daytime? 'How do you feel about him/her having naps?'). For analyses, parents' attitudes towards napping were coded by the researchers into the categories: encourage, allow, or prevent their child from napping, or child does not want to nap. After listening to the interviews multiple times, CJ coded all participants to one of these categories according to their interview discussions. An independent researcher selected and blind coded a sample of interviews from five participants. The two sets of coding revealed 100% agreement regarding parents' attitudes towards napping without necessitating discussion and so the coding method implemented was considered to be reliable.

In the structured diaries parents documented their child's bedtime, sleep onset time (the time at which they fell asleep) and wake time for 5 consecutive nights; and the start time, duration and location of daytime naps on the 4 intervening days. Nighttime sleep duration was calculated for each child for each night, using sleep onset and wake times. The duration of naps was totalled for each day. For all sleep-wake variables, weighted means were calculated for each child to account for the different number of week and weekend nights/days, and because previous research has demonstrated that sleep duration can vary between weekdays and weekends in children as young as 3-years-old [13] (calculated as  $[\text{mean week night/day value} \times 5 + \text{mean weekend night/day value} \times 2] / 7$ ). Weighted mean nighttime sleep duration and weighted mean daily nap duration were totalled to estimate weighted mean total 24-hour sleep duration. Sleep diaries were validated against actigraphy in a sub-sample of 18 children, and close correlation was found between measures [12]. The difference between diary- and actigraphy-derived measures of sleep onset time, wake time and daily nap duration was between 2-8 minutes for each measure. Pearson's correlation was  $r > .80$  ( $p \leq .001$ ) for all, and paired samples t-tests were all  $p > .05$ . The total number of naps which each child had and the location of each nap were coded and entered into a spreadsheet for analyses.

Weighted mean daily nap duration was non-normally distributed, and so non-parametric statistical tests were employed (Spearman's correlations, Mann-Whitney U and Wilcoxon signed rank tests). Other sleep-wake variables were normally distributed and for analyses not including nap duration, independent samples t-tests, paired samples t-tests and Pearson's correlations were used. Associations between categorical variables were performed using chi-square and Fisher's exact tests.



## Results

Five nursery schools participated. Based on the Index of Multiple Deprivation, the three in the ‘deprived’ group were in the 20% most deprived wards in England, and the two in the ‘non-deprived’ group were in the 20% least deprived wards. Accordingly, there were significant differences in weekly household earnings, proportion of residents claiming income benefits, proportion of adults with poor literacy and numeracy, and proportion of adults unemployed between the deprived and non-deprived areas in which the nurseries were located, in the directions expected [14].

Parents of 29 children were not invited to participate because they did not bring their children to or from nursery themselves and could not be approached by the researcher (n=11), or they were ineligible due to language barriers or nursery staff discretion (n=18). Parents of 133 children were invited, and 108 consented (response rate 82%). The response rate was similar in the deprived (81%) and non-deprived (83%) areas. All parents were interviewed, and 91 returned diaries. Data were incomplete for 7 diaries, resulting in a total of 84 families with complete data who were included in analyses.

Characteristics of these 84 families are shown in Table 1. Amongst families in the deprived area group there were significantly smaller proportions of white British children and children living with both of their parents, and younger mean maternal age, compared to the non-deprived group (Table 1). There were no significant differences in child age or gender between the socioeconomic groups.

### Children’s napping habits

Sleep onset time and wake time were significantly later on weekend compared to week nights ( $t=-5.08$ ,  $p<.001$  and  $t=-3.51$ ,  $p=.001$  respectively); there were no significant differences in nighttime sleep duration or daily nap duration between week and weekends ( $t=1.12$ ,  $p=.27$  and  $z=-.43$ ,  $p=.67$  respectively).

Children's sleep-wake variables are shown in Table 2 (weighted means), including associations with socioeconomic group, children's age and gender. There were no significant differences in daily nap duration or other sleep-wake variables between boys and girls and no significant associations between any sleep-wake variables and children's age. There was no significant difference in sleep onset time, wake time, nighttime or total sleep duration between the two groups based on socioeconomic status, but children attending nurseries in deprived areas had significantly longer daily nap duration compared to those from non-deprived areas (see Table 2). Of the 43 children from deprived nurseries, 26 (60%) had at least one nap; of the 41 in non-deprived nurseries, 17 (41%) had at least one nap.

Figure 2 shows the number and daily duration of naps, for children in the deprived and non-deprived area groups. Around half of children (51%) had at least one daytime nap during the study period. For these children, daily nap duration was median (interquartile range) 21 (34) minutes per day. The majority of nappers had only one or two naps across the four days. Children who had two, three or four naps were more commonly from deprived areas. A total of 73 naps were reported: the majority took place in the living room/on the sofa (51%) or in a car (29%), with just four occurring in a bedroom (6%). Other nap locations were a pushchair (4%), or were unknown (not entered in diaries).

### **Associations of nap duration with sleep-wake variables**

Associations of daily nap duration with sleep-wake variables are shown in Figure 1. The positive correlations with sleep onset time and wake time reached significance ( $r_s=.43$ ,  $p<.001$  and  $r_s=.33$ ,  $p=.002$  respectively). There was a statistically significant inverse correlation between daily nap duration and duration of nighttime sleep ( $r_s=-.25$ ,  $p=.02$ ), but not total 24-hour sleep duration ( $r_s=.16$ ,  $p=.15$ ).

### **Parents' attitudes towards napping**

In interviews parents of 29 children described implementing strategies to prevent their child from napping. Various methods were reported, such as giving sweets and engaging them in activities. The commonest reason given by parents for these strategies was that daytime napping would delay subsequent bedtimes, and decrease nighttime sleep, which was considered undesirable. In contrast, seven parents described encouraging their child to nap. For these parents, the main reason was to prevent children from becoming bad tempered or misbehaving in the absence of naps. A further eighteen parents allowed their children to nap if they wanted to, but did not actively encourage it. Parents mainly described children's napping as opportunistic, rather than planned or scheduled. Particularly, parents described their children falling asleep in the living room whilst watching TV, and them napping only occasionally in the car or when he or she was ill. Thirty parents were unable to comment on their attitude towards napping because they said that their children did not want to nap.

To examine characteristics associated with different attitudes towards napping, families were categorised according to whether parents allowed or encouraged naps ( $n=25$ ), tried to prevent naps ( $n=29$ ), or were unable to comment because their children did not want to nap ( $n=30$ ). There were no significant differences between

the three groups in terms of children's age ( $F=1.77$ ,  $p=.18$ ), maternal age ( $F=1.49$ ,  $p=.23$ ), or number of siblings ( $F=1.75$ ,  $p=.18$ ). There were also no significant differences in ethnicity or household composition between children who were allowed/encouraged to versus prevented from napping ( $p=.33$  and  $p=.49$  respectively). There was a significant association with gender: naps were allowed or encouraged for 41% of boys versus 16% of girls, and prevented for 26% of boys versus 47% of girls (remainder did not want to nap) ( $X^2=6.92$ ;  $p=.03$ ). Allowing naps was significantly more common in the deprived than non-deprived area group (42% of parents in the deprived area group allowed naps versus 17% in the non-deprived group; and 33% versus 37% of parents in each group tried to prevent naps respectively) ( $X^2=6.96$ ,  $p=.03$ ).

### **Association of parents' attitude towards napping with children's daily nap duration**

Comparisons in daily nap duration between the three groups based on parents' attitude towards napping are shown in Table 3. There was a significant association between positive parental attitude towards napping and longer child daily nap duration. When parents whose children did not want to nap were excluded from analyses, daily nap duration remained significantly longer for children whose parents allowed or encouraged naps compared to those who tried to prevent naps ( $U=222$ ,  $p=.01$ ).

## **Discussion**

Around half of this sample of English 3-year-old children napped during their 4-day study period. Children who napped displayed a wide range of napping habits,

with the majority napping only once or twice.. Most nappers (70%) napped for less than 30 minutes per day, and the majority of naps occurred in the living room, with only 6% occurring in a bedroom. Overall these results indicate that with the exception of a few regular nappers, napping patterns were generally inconsistent and sporadic, rather than routine and regulated by parents. This is supported by parents' descriptions of children napping opportunistically whilst in the car or watching TV.

Many more parents tried to prevent their children from napping than encouraged it, due to perceptions that napping would delay bedtime and disrupt nighttime sleep. This echoes the finding of Weissbluth [5] that parents stopped their children's daytime naps in order to encourage earlier nighttime sleep onset. The results of the present study support parents' perceptions that napping is associated with later sleep onset time and shorter nighttime sleep. However, the direction of this relationship – whether short nighttime sleep results in napping, or whether napping is a consequence of short nighttime sleep – cannot be ascertained from these data. Interestingly, daily nap duration was positively correlated with both sleep onset time and wake time, and negatively correlated with nighttime sleep duration, indicating that later wake times did not compensate for later sleep onset times with increasing nap duration.

Parental attitude towards napping was significantly associated with daily nap duration. Children's age was not significantly associated with either daily nap duration or parents' attitude towards napping, indicating that this association is age-independent. Nap duration was shortest in the group whose parents reported that their children did not want to nap, which may indicate that parents are able to accurately assess when their children have out-grown the need for daytime napping, or that these children have become accustomed to not being permitted to nap. Strategies to prevent

naps appeared to be successful in that these children exhibited shorter nap duration than those who were allowed or encouraged to nap. Although causality cannot be determined, these results may indicate that parents are able to influence children's napping behaviour. This is important because it may overrule children's biological drive and have consequences for their sleep duration and associated health. Parents who prevent napping may recognise their child's urge to nap but not recognise this as a developmental sleep need that could, perhaps should, be fulfilled. The consequences of the premature cessation of napping are not known: there are no evidence-based guidelines regarding optimal napping habits at different ages for health and development. Future research should examine causality between parents' attitudes and children's nap duration.

More parents in the deprived group allowed or encouraged napping, and more parents in the non-deprived group tried to prevent napping. This may contribute to the observed difference in napping duration between children in the deprived and non-deprived groups. Less advantaged parents were found to be less likely to implement regular bedtimes and routines for their preschool children in a previous study [15]. The results presented here indicate that parents' attitudes vary by socioeconomic status and are associated with children's sleep during the day as well as at night. Although nap duration varied between socioeconomic groups, other sleep-wake variables including nighttime and total 24-hour sleep duration did not, in keeping with previous findings in young English children [6].

Parents in this sample were more likely to prevent girls from napping, and to allow or encourage boys to nap. This was despite there being no significant difference in the number of boys or girls between the deprived and non-deprived groups, or gender-related variation in nap duration. We are not able to explain this finding with

data from our interviews. Perhaps it is due to real or perceived temperament differences between boys and girls, or to different expectations and norms for boys' and girls' sleep (although sleep-wake variables, including actual nap duration, did not vary between boys and girls in this sample). In contrast to our results, a UK cohort study by Blair et al. [6] found that boys napped for longer during the day than girls, perhaps to ameliorate their shorter nighttime sleep. Future research should further examine differences in parents' sleep attitudes and practices and children's daytime napping duration between young boys and girls.

In this sample total sleep duration over 24-hours (11:24) was similar to that reported in Blair et al.'s large UK cohort at age 3 years (11:31) [6]. However, total sleep duration was short compared to other available reference values for 3-year-old or preschool children as measured by parental report (12:30 [3]; 11:54 [2]; 11:40 [16]; 13:06 [17 British subsample]). Napping in particular was infrequent and short (51% of our sample napped, median daily duration for nappers was 21 minutes). In comparison, Crosby et al. [4 white American subsample], Iglowestein et al. [3] and Weissbluth [5] found that 80%, 50% and 92% of 3-year old children napped, with mean daily duration of 1:40, 1:42 and 2:06, respectively, also as assessed by parental report. A smaller proportion of 3-year-olds napped in Blair's [6] English cohort (23%) but daily nap duration for these children was longer than for our study (1:03). Blair and colleagues [6] suggest that differences in sleep duration between studies may be attributable to generational changes: it is thought that sleep has decreased in recent decades [3] with up to a quarter of children now failing to achieve sufficient sleep duration for their age [18]. Poor and insufficient sleep has an array of adverse consequences for children's health and wellbeing [19] [20], placing emphasis on developing strategies to increase sleep duration. Longer daily nap duration

compensated for shorter nighttime sleep duration in our sample, resulting in total sleep duration over 24-hours being relatively constant regardless of daily composition of sleep, as found in previous studies [6] [10] [16]. Perhaps napping is an effective way to ameliorate the effects of short nighttime sleep, and should be considered as a strategy to increase overall sleep duration in children. Future research should explore whether the introduction of, or increase in, napping impacts 24-hour sleep duration.

Further to increasing overall sleep duration, napping may be specifically beneficial for health. Agras et al. [21] found that children who were overweight at age 9.5 years had slept on average 30 minutes less per day between ages 3-5 years compared to those of normal weight, and this difference was almost entirely due to disparities in daytime napping. There is some suggestion that nighttime sleep and daytime naps have different physiological functions for young children. Nighttime sleep has complex biological, psychosocial and restorative functions, whilst daytime naps reduce psychosocial stress, and increase attention span and alertness [22] [23]. In adults, daytime napping has been associated with greater cardiovascular recovery [24].

It is unknown whether consolidated nighttime sleep versus combined daytime and nighttime sleep has different consequences for child health and development, but this should be further explored. Lack of naps and consolidation of sleep into a single nighttime bout is relatively recent in evolutionary terms [25]. Consequences of this change in sleep patterning are undetermined: perhaps there is discordance between modern sleep patterns and those that are biologically optimal [26].

We used weighted means due to differential sleep patterning across the week, to avoid data from individual days disproportionately influencing the outcomes. We believe this provides a more accurate representation of ‘average’ sleep patterns per



day where family activities and sleep-wake patterns may vary between weekdays and weekends. Analysing our data using non-weighted means (simple week/weekend averages) did not alter our conclusions; for example, non-weighted mean daily nap duration was significantly associated with parents' attitude towards napping, socioeconomic group, and not with child age.

There are a number of limitations to this study that should be noted. We did not account for night wakings in our estimate of nighttime sleep duration; and sleep duration was assessed by parental diary report, rather than measured objectively. This is the most common method of measuring child sleep duration in population studies, and diary records, including daily nap duration, were directly validated by actigraphy in a subsample for this study [12]. We calculated sleep duration in the same way for all children and so comparisons between groups should not be affected. That we did not account for night wakings suggests that our results may overestimate children's sleep duration, which, given that sleep was short compared to reference data, is worrying. This was a purposive sample and the applicability of the findings to other English preschool children cannot be determined, however the wide socioeconomic range of participants may have strengthened generalisability. This was an exploratory study; some results may have failed to reach statistical significance because the study was underpowered. Further research is required with larger, representative samples. Potential other confounding factors were not tested, but napping is determined primarily by children's age, which was constant for all participants.

This study documents a first attempt to examine parents' attitudes towards children's napping, and the association with nap duration, in young English children. The results indicate that positive parental attitude towards napping is associated with longer children's napping compared to negative parental attitude. Causality should be

tested in large, representative samples of children, along with the impact of parents' attitudes on children's sleep duration over 24-hours and associated health. Napping was negatively perceived and prevented by many parents in this sample. The consequences of premature nap cessation are not known, and short nap duration in this sample may have contributed to the observed short overall daily sleep duration in comparison to reference populations. Overruling children's biological sleep drive with parental preferences and attitudes could have unknown impacts on child health and development. It is timely to consider enabling young children to nap more freely.

### **Acknowledgements**

We thank the nursery staff, parents and children who participated in this study. Also the Economic and Social Research Council, Medical Research Council, and the Biosocial Society who provided funding for this research. Thank you to Megan Newark, our independent researcher who blind-coded interviews.

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Table 1: Characteristics of Participants

	Whole sample	Deprived area group	Non-deprived area group	p value
Child's gender (n (%) male)	46 (55)	27 (63)	19 (46)	.13 <sup>a</sup>
Child's ethnicity (n (%) white British)	78 (93)	37 (86)	41 (100)	.01 <sup>b</sup>
Child's age (months) (mean±SD)	41±3	41±3	42±4	.10 <sup>c</sup>
Mother's age at child's birth (years) (mean±SD)	28±6	25±5	31±5	<.001 <sup>c</sup>
Number of siblings (n(%))				
0	22 (26)	12 (28)	10 (24)	.89 <sup>c</sup>
1	39 (46)	16 (37)	23 (56)	
2	19 (23)	15 (35)	4 (10)	
3	3 (4)	0 (0)	3 (7)	
4	0 (0)	0 (0)	0 (0)	
5	1 (1)	0 (0)	1 (2)	
Family composition (n (%) live with both parents)	72 (86)	31 (72)	41 (100)	<.001 <sup>a</sup>

<sup>a</sup>Chi-square test<sup>b</sup>Fisher's exact test<sup>c</sup>Independent samples t-test

Table 2: Children's Sleep-Wake Variables and Associations with Socioeconomic Group, Age and Gender

Sleep Variable	Whole Sample (hh:mm)	Deprived area group (hh:mm)	Non-deprived area group (hh:mm)	p value	Association with children's age (p value)	Association with children's gender (p value)
Weighted mean sleep onset time (mean (SD))	20:11 (0:51)	20:18 (0:58)	20:04 (0:43)	.20 <sup>a</sup>	.72 <sup>c</sup>	.24 <sup>a</sup>
Weighted mean wake time (mean (SD))	7:24 (0:38)	7:28 (0:41)	7:20 (0:34)	.35 <sup>a</sup>	.23 <sup>c</sup>	.71 <sup>a</sup>
Weighted mean nighttime sleep duration (mean (SD))	11:12 (0:38)	11:09 (0:36)	11:16 (0:40)	.42 <sup>a</sup>	.47 <sup>c</sup>	.22 <sup>a</sup>
Weighted mean daily nap duration (including nappers and non-nappers) (median (interquartile range))	0:01 (0:21)	0:09 (0:29)	0:00 (0:08)	.01 <sup>b</sup>	.08 <sup>d</sup>	.58 <sup>b</sup>
Weighted mean total 24-hour sleep duration (night and naps) (mean (SD))	11:24 (0:35)	11:26 (0:30)	11:22 (0:40)	.58 <sup>a</sup>	.67 <sup>c</sup>	.53 <sup>a</sup>

<sup>a</sup>Independent samples t-test<sup>b</sup>Mann-Whitney U test<sup>c</sup>Pearson's correlation<sup>d</sup>Spearman's correlation

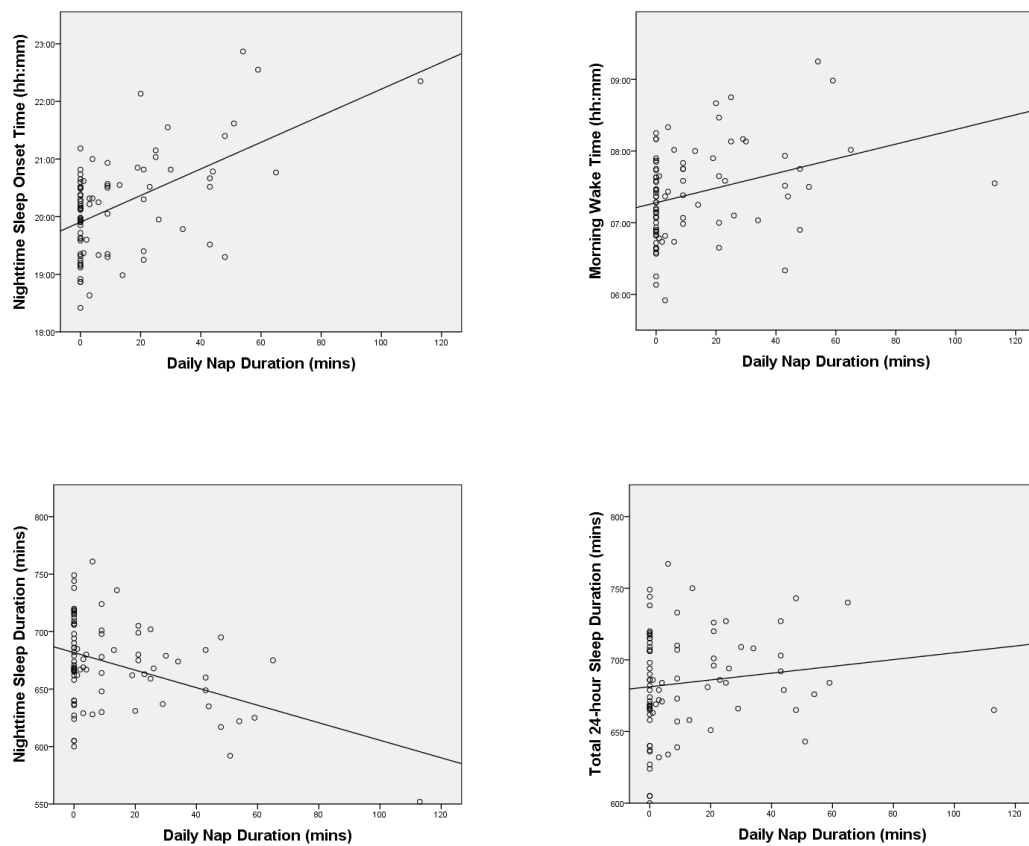


Table 3: Association between Parents' Attitudes towards Napping and Children's Nap Duration

Parents' Attitude towards Napping	Weighted Mean Daily Nap Duration (mins) Median (interquartile range)	U	p value
Allow or encourage	21 (34)	23.21 <sup>a</sup>	<.001
Try to prevent	1 (21)		
Child does not want to nap	0 (0)		

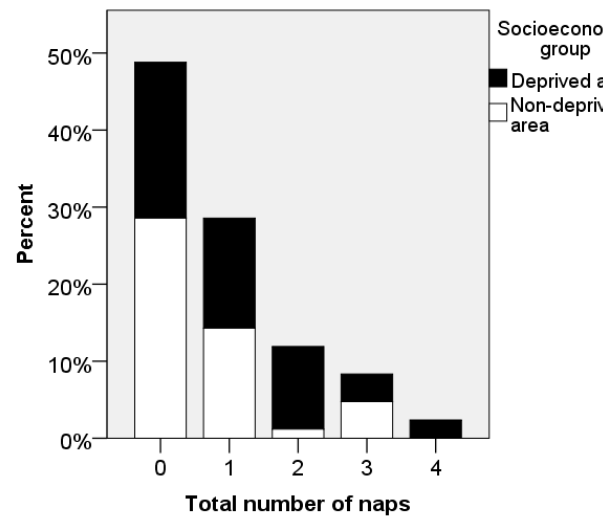
<sup>a</sup>Mann Whitney U test

Figure 1: Correlations of Daily Nap Duration with Sleep Onset Time, Wake Time, Nighttime Sleep Duration and Total 24-hour Sleep Duration<sup>a</sup>

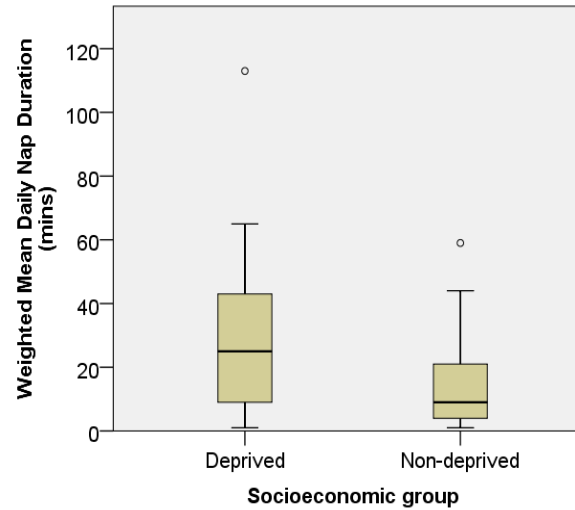


<sup>a</sup> All values are weighted means

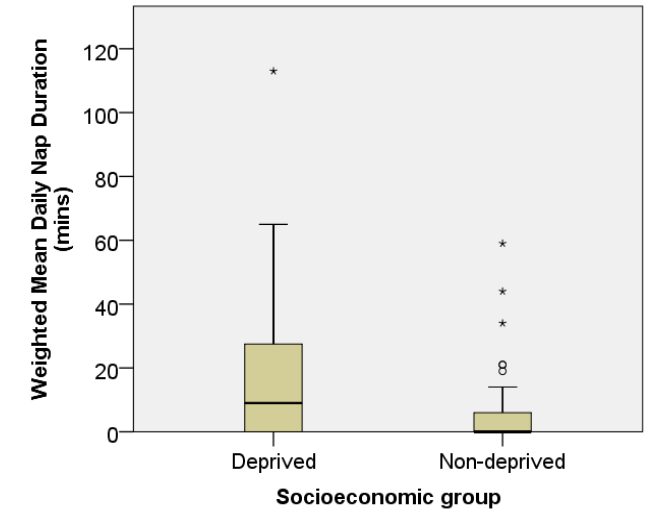
Figure 2: Number and Daily Duration of Naps in the Deprived and Non-Deprived Area Groups



Total number of naps that children had during the four-day study period



Daily nap duration for only those children who had at least one nap



Daily nap duration for all children